REMARKS

Claims 1 and 3-20 are pending in the present application. By this Amendment, Claims 1, 3 and 5 are amended; and Claims 2 and 21-42 are canceled as being drawn to a non-elected invention. Support for the amendments is found at p. 18, lines 20-24 of the specification. Based on the foregoing amendments and the following remarks, Applicants respectfully request allowance of the pending claims.

I. Prior Art Rejections:

Claims 1, 2, 5-11 and 14-20 were rejected under 35 U.S.C. §102(e) as being anticipated by or, in the alternative under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,117,438 to Topolkaraev et al. (hereinafter "Topolkaraev"). Additionally, Claims 12 and 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Topolkaraev. These rejections are respectfully traversed.

Claim 1 is directed to, *inter alia*, a porous, flushable, ductile, breathable film, wherein the film is formed from an extruded precursor film, the extruded precursor film comprising a homogeneous blend of a water-soluble polymer and a particulate filler, wherein the filler comprises at least 10 percent by weight of the precursor film, and the precursor film having an elongation-at-break of greater than about 150%, further wherein the precursor film, when stretched, forms pores around the particulate filler thereby increasing the breathability of the breathable film; further wherein the water-soluble polymer is selected from poly(ethylene oxide) or modified poly(ethylene oxide).

Topolkaraev is commonly owned by the Assignees of the present application, Kimberly Clark Worldwide. Topolkaraev is directed to a multi-microlayer film use as a barrier film.

It is respectfully submitted that Topolkaraev fails to teach or suggest Applicants' claimed invention. As set forth by the Examiner, Applicants provide herewith a copy of the invention disclosure for the present invention (Exhibit A). As set forth in part 2 of paragraph 9 of the September 23, 2002 final office action, Applicants respectfully submit that the date of the invention for the claimed subject matter is prior to the effective U.S. filing date of Topolkaraev and, as such, Topolkaraev does not constitute prior art under 35 U.S.C. §102(e). Additionally, as both inventions have been assigned to Kimberly Clark, both the subject matter of the present invention and the subject matter of the reference were, at the time the invention was made,

owned by the same entity or subject to an obligation of assignment to the same enitity - Kimberly Clark Worldwide.

Additionally, it is respectfully submitted that the Examiner has misread the teachings of Topolkaraev. Topolkaraev is specifically directed to multi-microlayer films having alternating layers of a water-soluble polymer and a non-degradable polymer, not homogenous films of a water-soluble polymer and a non-degradable polymer. These films may include a filler material. The alternating layers of water-soluble polymer and non-degradable polymer prevent fluids from passing through the film thereby resulting in the barrier properties. Homogenous films would not have the same characteristics and, as such, the multi-microlayer approach disclosed and claimed in Topolkaraev in one of the bases of novelty. These films are not a homogenous blend of a water-soluble polymer and a filler, as claimed by Applicant. Applicants' claimed films could not be used as barrier films as there is no non-degradable polymer used and the water-soluble polymer would be inadequate as a barrier material. As such, since Topolkaraev provides barrier films and specifically claims a multi-microlayer film, Topolkaraev fails to teach or suggest a homogeneous blend of a water-soluble polymer and a filler extruded to form a precursor film that is then stretched to form the breathable film of the present invention. Accordingly, Topolkaraev fails to teach or suggest Applicants' claimed invention.

For at least the reasons given above, Applicant respectfully submits that Claim 1 is allowable over the art of record. Furthermore, since Claims 2, 5-11 and 14-20 recite additional claim features and depend from Claim 1, these claims are also allowable over the art of record. Accordingly, Applicants respectfully request withdrawal of this rejection.

Claims 3 and 4 were rejected under 35 U.S.C. §103(a) as being unpatentable over Topolkaraev in view of Wang. This rejection is respectfully traversed.

Applicants' claimed invention may be relied upon as discussed above.

Applicants' discussion of Topolkaraev may be relied upon as discussed above.

Wang is commonly owned by the Assignees of the present application, Kimberly Clark Worldwide. Wang is directed to a grafted poly(ethylene oxide) composition.

It is respectfully submitted that the combination of Topolkaraev and Wang fails to teach or suggest Applicants' claimed invention. As discussed, Wang is simply directed to a grafted poly(ethylene oxide) composition and does not disclose the use of particulate fillers. Additionally, Wang fails to teach or suggest a homogeneous blend of a water-soluble polymer and a filler. As such, Wang fails to remedy the deficiencies of Topolkaraev. Accordingly, the

combination of Topolkaraev and Wang fails to teach or suggest Applicants' claimed precursor film, and therefore Applicants' breathable film made therefrom.

For at least the reasons given above, Applicant respectfully submits that Claim 1 is allowable over the art of record. Furthermore, since Claims 3 and 4 recite additional claim features and depend from Claim 1, these claims are also allowable over the art of record. Accordingly, Applicants respectfully request withdrawal of this rejection.

Claims 1, 7 and 11-18 were rejected under 35 U.S.C. §102(e) as being anticipated by or, in the alternative under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,057,061 to Callahan et al. (hereinafter "Callahan"). This rejection is respectfully traversed.

Applicants' claimed invention may be relied upon as discussed above.

Callahan is directed to a battery separator comprising a microporous film containing ethylene vinyl alcohol copolymer with a filler..

It is respectfully submitted that Callahan fails to teach or suggest Applicants' claimed invention. Callahan is directed to battery separators, not breathable films used in personal care articles. Callahan discloses a film containing ethylene vinyl alcohol copolymer and does not teach or suggest using poly(ethylene oxide) or modified poly(ethylene oxide) as part of a breathable film used in personal care articles. Accordingly, since Callahan does not teach or suggest using poly(ethylene oxide) or modified poly(ethylene oxide) as part of a breathable film, it is respectfully submitted that Callahan fails to teach or suggest Applicants' claimed invention.

For at least the reasons given above, Applicant respectfully submits that Claim 1 is allowable over the art of record. Furthermore, since Claims 2, 7, 8 and 11-17 recite additional claim features and depend from Claim 1, these claims are also allowable over the art of record. Accordingly, Applicants respectfully request withdrawal of this rejection.

II. Conclusion:

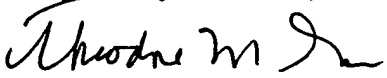
For at least the reasons given above, Applicant submits that Claims 1 and 3-20 define patentable subject matter. Accordingly, Applicant respectfully requests allowance of these claims.

The foregoing is submitted as a full and complete Response to the Final Office Action mailed September 23, 2002 and the Request for Continued Examination filed February 23, 2003, and early and favorable consideration of the claims is requested.

Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance, the Examiner is respectfully requested to contact Applicants' representative at the telephone number listed below.

No additional fees are believed due; however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 11-0855.

Respectfully submitted,



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Attorney File No.: 44040.228085
K-C No. 12,652

12,652

Invention Disclosure

Submitter:
Send the signed original and one copy of this form to Kimberly-Clark Corporation, Patent Department, Neenah, WI. Answer all parts of this form. Two corroborators must understand the invention. The submitter(s) and both corroborators must sign and date the reverse side of this form in blue ink, as well as every additional sheet submitted with it. The last part of this form is recommended when additional sheets are required. If your group has a patent facilitator, preview the original with him or her.

Disclosure No. _____

Department _____

Recommended Attorney _____

For Legal Department use only

Key Words

Water-soluble, flushable, films, polyethylene oxide, PEO, high-strength, ductile, fillers, breathable, stretching.

1. Title

High Strength and High-Ductility Flushable Films of Polyethylene Oxide, Breathable PEO Films, and Process for Making the Films

2. Description *(Sign and date each page. Attach pertinent drawings, photographs, etc.)*

a. Summary *(Should disclose invention in general, nontechnical terms)*

This invention discloses high-strength and high-ductility flushable films of polyethylene oxide (PEO). The disclosed PEO films are water-soluble and they are especially useful for flushable applications such as flushable diapers, feminine pads, pantiliners, training pants, etc. This disclosure also describes the process to extrude high molecular weight PEO resins which have high melt viscosity and typically present processing difficulties during extrusion. The mechanical properties of the PEO films make them desirable for stretchable applications. This invention also discloses breathable PEO films which provide in-use comfort for many personal care products. The mechanically strong and ductile films disclosed in this invention overcome the major deficiencies of typically weak and brittle PEO films. The mechanical integrity of the PEO films is essential to achieving the practical use of the films.

b. Detailed description, including specific embodiments and applicable alternatives, ranges and products, and process/apparatus variations.

1) General Description of the Product

The high-strength and ductile PEO films are made from high molecular PEO resins. The PEO resins useful for this invention can have molecular weight from about 500,000 g/mol to 8,000,000 g/mol. Although higher molecular weight PEO resins are desirable for mechanical and physical properties, low molecular weight PEO resins provide the best balance between the mechanical/physical properties and the film-forming properties. As a result, the preferred range of molecular weights of PEO resins ranges from 800,000 to 6,000,000 g/mol. To make PEO films containing fillers for stretchable applications, a wide range of inorganic fillers are applicable for this invention such as calcium carbonate, silica, titanium oxide, etc.

For the development of the functional PEO films, e.g. for a stretch processing for enhanced breathability, filler can be incorporated into PEO resin. The selection of fillers is based on consideration of key parameters such as size, shape, and interaction with matrix polymer. To prevent critical flaw formation during stretching, filler size distribution should have average of around 1 micron and top cut below 10 microns. Particles greater than 10 micron result in excessive discontinuity during stretching and stress build-up in the matrix polymer. Very fine particles with the size less than 0.2 micron are also not effective in terms of material processing, agglomeration, and pronounced reinforcing tendencies. The filler with small aspect ratio and low coupling with polymer resin is preferred. Inorganic fillers preferred for this invention include: calcium carbonate, silica, aluminum hydroxide, glass microspheres, etc.

Title **High Strength and High-Ductility Flushable Films of Polyethylene Oxide, Breathable PEO Films, and Process for Making the Films**

2) Process for Extruding High Molecular Weight PEO Resins

The process for extruding high molecular weight PEO resins was initially demonstrated on a counter-rotating, twin-screw extruder. The extruder contains a pair of custom-made, counter-rotating conical screws.

Screw Design for the HAAKE Extruder

A general characteristic description is provided since the exact dimensions may be proprietary to the extruder manufacturer.

Sections	**Descriptions**
Section 1:	A double flighted forward pumping section:
	Large screw lead (pitch) and a high helix angle
Section 2:	A double flighted forward pumping section:
	Screw pitch is smaller than Section 1
Section 3:	A double flighted forward pumping section:
	Screw pitch is smaller than Section 2
Section 4:	A double flighted and notched reversed pumping section
	One complete flight with notches
Section 5:	A double flighted notched forward pumping section
	Two complete flights
Section 6:	A double flighted forward pumping section

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The foregoing signed disclosure was read and understood by me on the date hereinafter set forth.

Corroborator	Dave A. Soerens	ET/WRE	Signed	2	23 1996
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Corroborator	Yihua Chang	ET/WRE	Signed	2	23 96
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Screw pitch is between sections 1 and 2.

PEO resin pellets of a molecular weight of 1,000,000 (WSR 12k, by Union Carbide) were flood fed into the twin screw extruder at 50 and 150 rpm, respectively. The extruder temperatures were set at 180, 180, 180, and 180°C for the first, second, third heating zones on the extruder and the die. Strands of smooth surface were resulted. The strands were cooled on a fan-cooled conveyor belt and then pelletized. This extrusion was made under the optimized conditions which allowed extrusion at high extrusion rate, i,e. higher screw speeds.

At high extrusion rate, the extrudate exiting the die quickly formed curved patterns, most likely due to the melt relaxation of the melt. This melt relaxation behavior made the pelletization difficult. The situation was relieved at lower extrusion rate.

3) Process for Blending of High Molecular Weight PEO Resins with Fillers

On the same extruder, the high molecular weight PEO was blended with an inorganic filler or a mixture of fillers such as the calcium carbonate, Supermite® supplied by ECC. The fillers can either be uncoated or coated with a liquid additive to improve the surface properties of the fillers or the resulting films. Examples of such additives include organosilicone surfactants of different HLB numbers. The weight fraction of the filler or filler mixture ranges from 10 to 90%, the preferred amount of filler ranges from 35 to 75% by weight. PEO resins were found to be effective to disperse the fillers and give strands of uniform and smooth surface.

A typical example for compounding of PEO with filler, includes a specifically selected Supermite grade of calcium carbonate, supplied by ECC International. Supermite has an average particle size of about 1 micron and top cut of 8 microns, and meets major requirements for filler selection.

The filler can be coated with liquid additives to reduce coupling at the resin-filler interface. Decoupling should facilitate debonding of filler from polymer matrix during stretching. This is especially important for polar PEO matrix, which demonstrates strong interaction with inorganic fillers. At the same time, coating should provide affinity to polymer resin for improved dispersion and deagglomeration. Examples of such additives include silicone glycol copolymers of different HLB numbers supplied by Dow Corning Corporation. The variation in HLB number can provide controlled interaction of the coated filler with PEO. More specifically FF400 additive (HLB=6.6) and 193 surfactant (HLB=12) have been used to coat calcium carbonate in a solvent-surfactant solution. Filler also can be precompounded with a surfactant before mixing with PEO resin, or additive can be compounded with resin and filler at the melt -blending step. The latter method reduces effectiveness of the coating.

Significant improvement in processing of high molecular weight PEO was achieved when uncoated, as well as coated, fillers were incorporated into the resin.

4) Mechnaical Properties of the High Strength Films

The tensile properties of films made from the high-strength PEO (Polyox WSR 12k) versus a commonly used low strength PEO (Polyox WSR N-80) are shown in Figure 1. The strain-at-break for the 12k film and the N-80 films were respectively 814% and 294%. The peak stress of the 12k and N-80 film were respectively 27.5 and 12.1 MPa. The strain-at-break and peak stress of the 12k film were respectively 177% and 127% higher than the N-80 film. For the 12k film, the yield stress was 8 MPa, while the fracture stress was 27.5 MPa. This makes the 12k film highly desirable for stretching applications. This showed that a film from high molecular weight PEO can be as strong and as tough as polyolefins!

Title **High Strength and High-Ductility Flushable Films of Polyethylene Oxide, Breathable PEO Films, and Process for Making the Films**

5) Stretching of the PEO Films

Stretching may be accomplished by tentering, by pantograph, by tensile testing device or by hand. In this invention stretching has been accomplished by uniaxial drawing on a Sintech tensile tester. This stretched film exhibited improved water solubility as compared with the unstretched PEO film. Films or sheets of filled PEO may be fabricated by any convenient technique such as compression molding or extrusion casting. An unexpectedly high level of ductility was achieved for the 12K PEO filled with about 40 % of calcium carbonate. The film demonstrated elongation at break of up to 600% and tensile strength of nearly 10 MPa. With the filler coated with the organosilicone additives, material with enhanced flexibility, about 20% reduction in modulus from 335MPa to 270 MPa, and improved drawability, nearly 30% reduction in yield stress from 12MPa to 8.5MPa, was developed. Reduction in modulus and yield stress indicates a decrease in the coupling at the PEO - filler interface, which is a determining factor for micropore generation durind stretching. Development of filled PEO material with a high level of strain at break, improved flexibility and reduced draw stress is an important finding for the development of stretched microporous, breathable PEO films.

A unique feature of the stretched, filled PEO film is a change in the fundamental mechanism of interaction with water. When the filled film was stretched unidirectionally up to 300% and then immersed in water, it immediately lost its structural integrity and disintegrated into very fine pieces. The unstretched films demonstrated relatively slow dissolution in water with the formation of a sticky surface layer. These findings can have significant impact on the development of rapidly disintegradable, breathable structural elements for the flushable personal care products.

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Manager (Review)	Gerald L. Kochanny	ET/WRE	Signed	02	28	96
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The foregoing signed disclosure was read and understood by me on the date hereinafter set forth.

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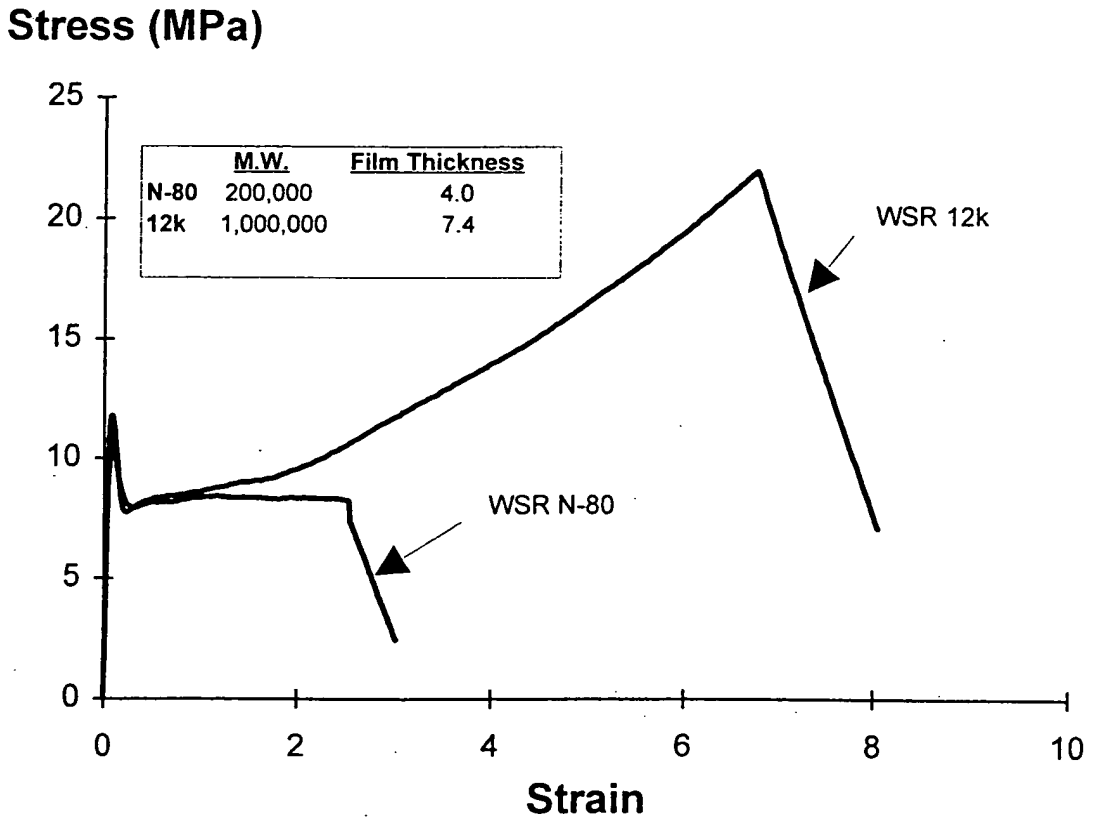
Corroborator	Yihua Chang	ET/WRE	Signed	2	23	96
		Dept./Location		Month	Day	Year

Invention Disclosure

Title **High Strength and High-Ductility Flushable Films of Polyethylene Oxide, Breathable PEO Films, and Process for Making the Films**

Fig. 1. Tensile Properties Comparison Polyox N-80 and 12k HAAKE Cast Films



c. How does the invention distinguish from what has been done in the past and what advantages are obtained? Identify related work done by others *(patents, journal articles, etc.)*. Identify other related disclosures of which you may have knowledge, or other work within Kimberly-ClarkCorporation within the same area.

A preliminary literature search on polyethylene oxide (PEO) films and filled PEO films was conducted by Mary Jo Meyer in Environmental Technology. No specific patents claiming these properties and no process on extruding high molecular weight PEO were found. A thorough prior art search is recommended prior to the filing of patent application(s).

Title **High Strength and High-Ductility Flushable Films of Polyethylene Oxide, Breathable PEO Films, and Process for Making the Films**

3. I (We) first conceived the above idea on March 30, 1995 and September 6, 1995
4. I (We) first disclosed the above idea to others on September 18, 1995.
5. The persons to whom the above idea was first disclosed are: Mary Jo Meyer, Dave Soerens, etc.
6. The first written description of the above idea is in the form of Patent Note dated September 6, 1995 and is now located in WRE 2636.
7. The first sketch or drawing of the above idea was made on Sept. 6, 1995 and is now located in WRE 2636. Its number is P-5008, p. 94.
8. The first sample illustrating the above idea was made on Sept. 6, 1995 and is now located in WRE 1639. Its sample number is .
9. The above idea was first actually tried on Sept. 6, 1995. Describe how and when it was tried, including a complete description and date of the first time the idea was tried and, if the first attempt was unsuccessful, the first time it was successfully tried.

   Developed process to extrude high molecular weight PEO and made both cast and pressed films. Demonstrated the superior mechanical properties of the resulting films. Developed process for compounding fillers with the high molecular weight PEO resins and made cast film containing calcium carbonate.

10. Has consumer use testing of this idea been carried out? N/A If "Yes," when? Describe testing:
11. Is consumer use testing planned for the future? If "Yes," when? Describe testing:
12. Has the idea been used in, or to produce, a product that was sold or offered for sale? No If "Yes," when? How used:
13. Has the idea been disclosed outside Kimberly-Clark Corporation? No If "Yes," when? . To whom:

    Was the idea disclosed under Confidential Disclosure Agreement? If "Yes," attach a copy of the agreement.
14. Is commercial use imminent? Yes If "Yes," indicate the anticipated earliest date of commercial use. 1999 or earlier
15. List the names of everyone who has contributed to this idea. *(Those listed cannot be corroborators. The listed people should receive a copy of this form.)*

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